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FOOD HABITS OF THE COMMON GARDEN MOLE.

(*Scalops aquaticus machrinus* Rafinesque.)

By L. L. Dyche, University of Kansas, Lawrence.

Read before the Academy, at Topeka, January 2, 1903.

COMMENCING with January, 1894, I have examined the stomachs of sixty-seven common garden moles of the above species. No specimens were taken during the months of December and February. The other months are represented by from two to a dozen specimens each. The moles were taken for the most part either on the University campus, which is rather high ground, or in the yard around my house, on rather low ground. No effort was made to take any particular number at any particular time or season. July, August and September have but two representatives each, while October and November are represented by about a dozen specimens each. Most of the animals were caught by using the mole traps which are sold in the markets—the kinds that work by the use of a coiled spring, which, when set off, drives a number of sharp spikes down into the ground and through the mole.

Out of the sixty-seven specimens taken, seventeen of the stomachs contained nothing, or only a trace of food. Fifty stomachs contained more or less food, many of them being well filled. To determine the nature and quantity of the food in the stomachs it was necessary to place the contents in a dish of water. After gentle washing the mass was placed on paper or a thin cloth seive, and the water allowed to filter away or be absorbed. The food matter was then examined with a hand or a low-power compound microscope. The different kinds of materials were pushed together and examined to determine the kind and relative quantity of food. One difficulty an observer has to contend with is the fact that the mole frequently chews its food very fine. Earthworms are easily made out, owing to the skins, which are tough. They hold together well and are easily recognized. While the skins of the grubs and the various kinds of larvæ are rather tough, and, as a rule, show the general shape of the animals, the head-parts, on the other hand, are comparatively hard, and the fine teeth of the mole crush them so much that they are hard to recognize. No attempt has been made to distinguish species, though the grubs of the June beetles (*Lachnosterna*) were frequently recognized. Coleopterous beetles could be made out quite satisfactorily, provided one had the time and patience to work the material over. Almost all of the beetles devoured were of the black or blackish-brown ground varieties, such, for instance, as *Harpalus pennsylvanicus.*

By referring to a chart which I have prepared, this paper becomes much more intelligible. It gives the dates of capture of the specimens, the kind and per cent., in quantity, as nearly as it could be estimated, of the various foods found in each stomach.

Earthworms constitute the most common article of food. Thirty-eight out of the fifty specimens had eaten earthworms, and six had eaten nothing else.

Earthworms constitute 42.20 per cent. of the entire food. Twenty-seven of the animals had eaten ground-beetles, which make up 22.7 per cent. of the entire food supply. Thirty-four stomachs contained grubs and larvæ of various kinds, which constituted 22.8 per cent. of the stomach contents. Four stomachs contained from 5 to 20 per cent. each of insect eggs, apparently those of grasshoppers.

One stomach contained twenty and another thirty ants, making in each case about 20 per cent. of the food.

Three stomachs contained myriopods (*Geophilus*). One mole had eaten seven specimens and another eleven, making 100 per cent. of the food in both cases, as there was no trace of anything else.

Vegetable food was represented by 3.7 per cent. Four of the animals had eaten kernels of corn, which made up from 10 to 65 per cent. of the food. These animals were taken in January and October. The animals were caught near fields where kernels of corn had perhaps been trampled into the earth and had become softened. Otherwise I do not see how the fine teeth of the mole could have chewed up the kernels. Two of these specimens, one taken January 18, 1894, and one October 6, 1894, had the stomachs well filled with corn. There was little doubt about the identification of the material, as the professors in the department of botany at the University assisted in its determination.

Seeds of grass, hemp and some long seeds that resembled small rye grains represented 20 per cent. of the food of a specimen taken January 8, 1894.

Four stomachs harbored from three to seven white parasitic worms about three-quarters of an inch long.

One animal, taken November 9, 1894, had an enlarged and diseased stomach. There were a number of warty-like blisters on the inside of the stomach as large as wheat grains. When opened, they contained a black substance that resembled the earth mud frequently found in the stomachs of the animals that had been feeding upon earthworms.

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Date of capture.		Per cent. of different kinds of food found in stomachs.				Kinds of food rarely found.		
		Earth-worms....	Beetles.....	Grubs and larvæ.....	Vegetable food....			
January	17, 1894.....	15	25	45	....	Insect eggs (grasshoppers)..	15	
"	18, 1894.....	10	25	....	Corn, 65			
"	18, 1894.....	....	40	40	Seeds, 20	....		*a*
"	19, 1894.....	25	30	15	Corn, 30			
March	13, 1894.....	65	....	35	....			
"	18, 1894.....	90	....	10	....			
"	22, 1894.....	40	30	20	....	Insect eggs..................	10	*b*
"	31, 1894.....	65	25	5	....	"	5	
April	7, 1894.....	....	35	65	....	....		*c*
"	7, 1894.....	15	65	20	....			
"	24, 1894.....	50	15	25	....	Brown chrysalis..............	10	
"	25, 1894.....	65	10	25	....			
May	3, 1901.....	....	....	....	....	Myriopods (*Geophilus*)	100	*d*
"	6, 1901.....	....	40	....	....	" "	60	
"	11, 1901.....	....	....	....	....	" "	100	
"	17, 1901.....	30	40	30	....			
June	5, 1902.....	100	....	....	....			
"	7, 1902.....	80	....	20	....			
"	11, 1902.....	70	....	30	....			
"	14, 1902.....	50	20	30	....			
"	27, 1902.....	70	....	30	....			
July	7, 1901.....	....	100	....	....			
"	12, 1901.....	40	60	....	....			
August	4, 1901.....	80	....	20	....			
"	21, 1901.....	30	20	50	....	....		*e*
September	20, 1902.....	100	....	....	....			
"	27, 1902.....	100	....	....	....			
October	3, 1902.....	80	....	20	....			
"	4, 1894.....	....	....	90	Corn, 10			
"	5, 1894.....	100	....	....	....			
"	6, 1894.....	....	20	20	Corn, 60			
"	7, 1894.....	20	25	55	....			
"	8, 1894.....	....	....	100	....	....		*f*
"	10, 1894.....	90	....	10	....			
"	10, 1894.....	80	....	20	....			
"	21, 1902.....	60	10	30	....			
"	29, 1902.....	100	....	....	....			
"	29, 1902.....	100	....	....	....			
"	29, 1894.....	40	20	40	....			
"	30, 1902.....	90	....	10	....			
November	5, 1894.....	40	....	60	....			
"	5, 1894.....	30	50	20	....			
"	6, 1894.....	20	60	10	....	Insect eggs..................	10	
"	7, 1894.....	....	30	50	....	Ants (20 in number).	20	
"	9, 1894.....	....	....	70	....	Brown chrysalis chewed up,	30	*g*
"	12, 1894.....	15	85	....	....			
"	24, 1894.....	80	....	....	....	Ants (about 30 in number)..	20	
"	24, 1894.....	25	75	....	....			
"	24, 1894.....	....	100	....	....	....		*h*
"	29, 1894.....	....	80	20	....			
Totals.............		2,160	1,135	1,140	185		380	

a. Hemp, grass, and other kinds of seeds.
b. Seven round, white parasitic worms about three-fourths of an inch long.
c. Three parasitic worms, each about three-fourths of an inch long, found in stomach.
d. Eleven specimens found in this mole's stomach; many whole specimens, but badly chewed.
e. Five white parasitic worms.
f. Nine *Lachnosterna* or June beetle grubs. Entire skins present, with hard head-parts pretty well chewed up.
g. Stomach enlarged; covered on inside with black, warty growths.
h. Three white parasitic worms about three-fourths of an inch long.

Total amounts of 50 specimens examined that contained food:
Average of earthworms, 43.20 per cent.
Average of beetles, 22.7 per cent.
Average of grubs and larvæ, 22.8 per cent.
Average of vegetable matter, 3.7 per cent.
Average of kinds of food rarely found, 7.6 per cent.
Seventeen stomachs contained nothing or only a small trace of food.

Another chart made from the examination of the stomachs of fifty other animals would undoubtedly be quite different from this one. However, this chart will give an idea based on the actual study of fifty stomachs, and will be a beginning for some one who may, in the future, give more time to the subject, and work it up more in detail.

I think that it is safe to say that, when the ground is moist and the earthworms are active, the animals feed freely upon them. When the ground is dry, and early in the spring or late in the fall, when the earthworms are not so active, grubs and beetles are eaten more freely and constitute a greater proportion of the food than they otherwise would.

It is evident that the damage done to lawns, gardens and fields by moles is due chiefly not to the food the animals eat, but rather to their manner of securing it. Moles make many burrows or runways two or three inches under the ground by digging and then lifting up the soil with their shoulders. In making these runways, the little animals root up and destroy many plants, and especially the grass that usually grows on the runways in lawns and pastures. Mice frequently follow along in the runways made by the moles, and do considerable damage to bulbs, roots, and grains.